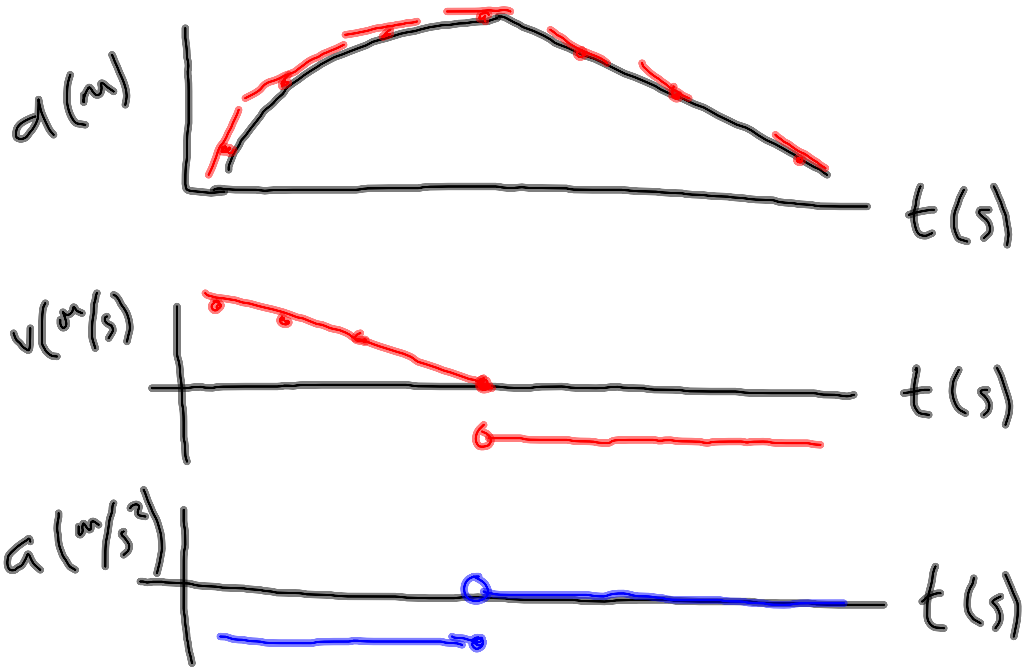
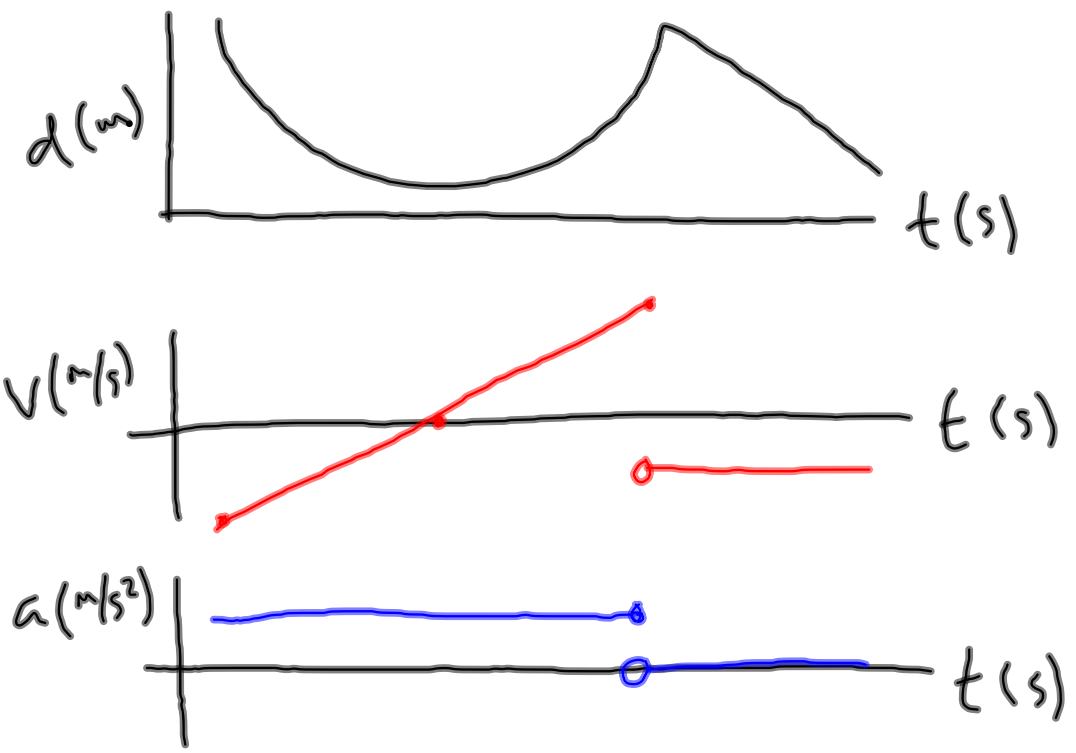
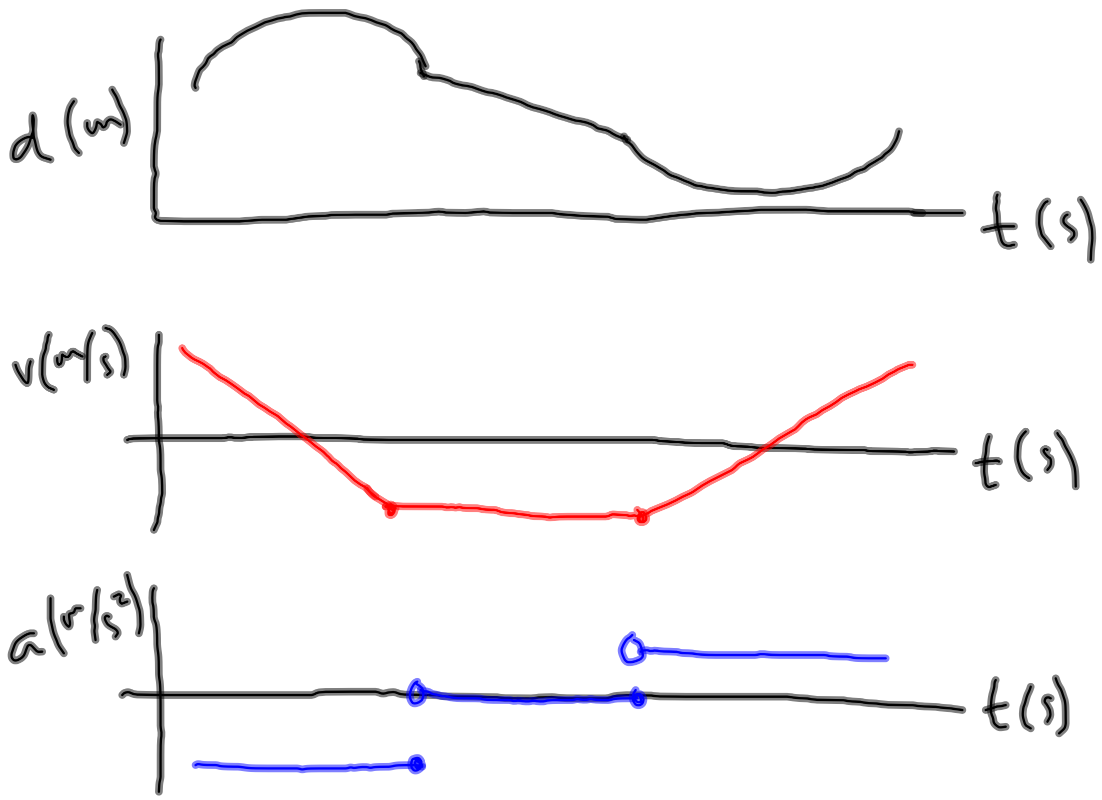
Major Topics:

- Kinematics:
  - 1-D motion
  - Projectile motion (2-D motion)
- Forces
  - FBDs
  - Types of forces
  - Many types of problems
- Work/Energy/Power
- Momentum
- Electrostatics and Circuits
- Waves/Sound/Light

Graphing:




d (m)
t (s)
v (m/s)
t (s)
a (m/s²)
t (s)


d (m)
t (s)
v (m/s)
t (s)
a (m/s²)
t (s)

Kinematics:

Scalar or Vector:	Variable:	Unit:
V	$x \to$ position	m
V	$\Delta x \to$ change in position displacement	m
S	$t \to$ time	s
V	$a \to$ acceleration	m/s^2
V	$V \to$ velocity	m/s
S	$\theta \to$ angle	degrees

Equations:

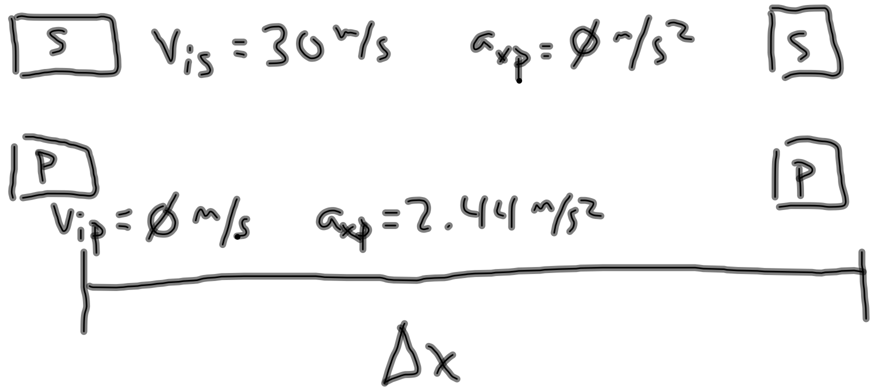
$$\Delta x = v_{ix} t + \frac{1}{2} a_x t^2$$

$$V_{fx} = V_{ix} + a_x t$$

$$V_{fx}^2 = V_{ix}^2 + 2 a_x \Delta x$$

Final Exam Review Notes 4th Block 1.3.12

A speeder passes a parked police car at 30.0 m/s. The police car starts from rest with a uniform acceleration of 2.44 m/s/s.
a) How much time passes before the speeder is overtaken by the police car?
b) How far does the speeder get before being overtaken by the police car?



a) $\Delta x = v_{ixs} t + \cancel{\frac{1}{2} a_{xs} t^2} \rightarrow \emptyset$ $\quad a_{xs} = \emptyset \text{ m/s}^2$

$\Delta x = \cancel{v_{ixp} t} \rightarrow \emptyset + \frac{1}{2} a_{xp} t^2$ $\quad v_{ixp} = \emptyset \text{ m/s}$

$v_{ixs} \cancel{t} = \frac{1}{2} a_{xp} t^{\cancel{2}}$

$t = \frac{2 v_{ixs}}{a_{xp}}$

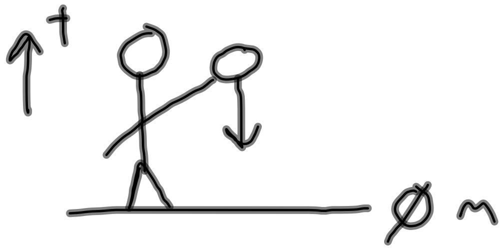
$= 24.6 \text{ s}$

b) $\Delta x = v_{ixs} t + \cancel{\frac{1}{2} a_{xs} t^2} \rightarrow \emptyset$

$= (30 \text{ m/s})(24.6 \text{ s})$

$= 738 \text{ m}$

Jason drops a volleyball from 2.0 m above the floor. How long will it take before the ball hits the ground?



$\Delta y = -2\ m$

$a_g = -9.8\ m/s^2$

$t = ?$

$v_{iy} = \emptyset\ m/s$

$$\Delta y = \overset{\to \emptyset}{\cancel{v_{iy}t}} + \frac{1}{2} a_g t^2$$

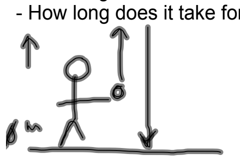
$$t = \sqrt{\frac{2\Delta y}{a_g}}$$

$$= 0.64\ s$$

Final Exam Review Notes 4th Block 1.3.12

Jason then hits the volleyball so that it moves with an initial velocity of 6.0 m/s straight up.
- What is the maximum height that the ball reaches?
- How long does it take to reach the maximum height?
- How long does it take for the ball to reach the floor?

initial height is 2 m



$y_i = 2\ m$ $\quad a_g = -9.8\ m/s^2$

$y_{max} = ?$ $\quad v_{iy} = 6\ m/s$

$v_{fy} = \emptyset\ m/s$

a) $\cancel{v_{fy}^2}^{\to \emptyset} = v_{iy}^2 + 2a_g\Delta y = v_{iy}^2 + 2a_g(y_{max} - y_i)$

$$-v_{iy}^2 = 2a_g(y_{max} - y_i)$$

$$y_{max} - y_i = \frac{-v_{iy}^2}{2a_g}$$

$$y_{max} = y_i - \frac{v_{iy}^2}{2a_g}$$

$$= 2\ m + \frac{(6\ m/s)^2}{2(+9.8\ m/s^2)}$$

$$= 3.84\ m$$

b) $\cancel{v_{fy}}^{\to \emptyset} = v_{iy} + a_g t$

$$t = -\frac{v_{iy}}{a_g}$$

$$= -\frac{(6.\ m/s)}{(-9.8\ m/s^2)}$$

$$= 0.61\ s$$

c) $\Delta y = \cancel{v_{iy}t}^{\to \emptyset} + \frac{1}{2}a_g t^2$

New:
$\Delta y = -3.84\ m$
$v_{iy} = \emptyset\ m/s$

$$t = \sqrt{\frac{2\Delta y}{a_g}}$$

$$= \sqrt{\frac{2(-3.84\ m)}{(-9.8\ m/s^2)}}$$

$$= 0.88\ s$$

$$\text{total time} = t_{up} + t_{down}$$

$$= 0.61\ s + 0.88\ s$$

$$= 1.49\ s$$